

REMARKS

I. Status of the Application

By the present amendment, Applicant amends claims 1, 11 and 21. Applicant also hereby cancels claims 2-3, 10 and 12-13 without prejudice or disclaimer. Claims 1, 4-9, 11 and 15-28 are all the claims pending in the Application, with claims 1 and 11 being in independent form. Claims 1-13, 15-21, 27 and 28 have been rejected.

The present Amendment addresses each point of objection and rejection raised by the Examiner. Favorable reconsideration is respectfully requested.

II. Formalities

Applicant thanks the Examiner for considering the references cited with the Information Disclosure Statement filed on February 28, 2007.

III. Claim Rejections Under 35 U.S.C. § 103

Claims 1 and 5-10 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent Publication No. 2002/0145711 to Magome et al. (hereinafter “Magome”) in view of JP 2000-103629 to Urano et al. (hereinafter “Urano”). Claims 2-3 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Magome, in view of Urano, in view of U.S. Patent No. 6,222,610 to Hagiwara et al. (hereinafter “Hagiwara”), in view of U.S. Patent No. 6,793,980 to Ohtsu et al. (hereinafter “Ohtsu”), and further in view of JP 2000-095535 to Fujinoki (hereinafter “Fujinoki”). Claim 4 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Magome, in view of Urano, and further in view of Ohtsu. Claims 27 and 28 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Magome, in view of Urano, in view of Hagiwara, in view of Ohtsu, and further in view of U.S. Patent No.

5,867,618 to Ito et al. (hereinafter “Ito”). The Examiner has rejected claims 11 and 15-21 under 35 U.S.C. §103(a) as allegedly being unpatentable over Hagiwara, in view of Urano, and further in view of Ohtsu. Claims 12-13 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Magome, in view of Urano, in view of Hagiwara, in view of Ohtsu, and further in view of Fujinoki. Applicant respectfully traverses these rejections for *at least* the reasons set forth below.

As an initial matter, Applicant notes that claims 2-3, 10 and 12-13 have been canceled without prejudice or disclaimer and, therefore, the Examiner’s rejections with respect to these claims are now moot.

A. Independent Claim 1

Without conceding the merits of the Examiner’s rejections, independent claim 1 has been amended, as set forth above, to include some of the features of claims 2 and 3 and to include some of the features mentioned on page 5, lines 4-6 of the specification.

The Examiner was not persuaded by Applicant’s previous arguments that neither Magome, Urano, nor any combination thereof, suggests the feature of hydrogen having a partial pressure of 0.01 to 500 kgf/cm², as recited in claim 1. In response, the Examiner alleges that the Applicant fails to point out how the prior art fails this, and alleges that the Office Action clearly points to the prior art that teaches this recitation.

Applicant respectfully traverses the Examiner’s rejection in this regard and notes that Applicant previously pointed out, in detail, how the prior art fails to teach or suggest the feature of hydrogen having a partial pressure of 0.01 to 500 kgf/cm² with the Amendment filed on November 30, 2006. The Examiner acknowledges that Magome is completely silent regarding

the feature of a container filled with a gas containing hydrogen, wherein the hydrogen has a partial pressure of 0.01 to 500 kgf/cm², as claimed. Nevertheless, the Examiner relies on Urano as allegedly teaching or suggesting this feature.

However, as previously explained by Applicant, Urano teaches nothing more than a method of manufacturing a product of silica glass. In particular, Urano teaches the impregnation of hydrogen into a product of silica glass, and then converting defect precursors in the silica glass into defects by radiating an excimer laser to the silica glass after the impregnation of hydrogen. But, Urano provides no teaching or suggestion regarding a continuous supply of hydrogen into the silica glass product during the use thereof. Indeed, there is no link whatsoever between the partial pressure of hydrogen recited in the optical apparatus of claim 1 and the pressure of hydrogen during a manufacturing process as taught in Urano.

As such, the Amendment filed on November 30, 2006 clearly establishes that neither Magome, Urano, nor any combination thereof teaches or suggests the feature of hydrogen having a partial pressure of 0.01 to 500 kgf/cm², as claimed. However, the Examiner has failed to provide any substantive response to the aforementioned arguments and, consequently, Applicant submits that the current rejections are improper for *at least* these reasons.

Second, Applicant submits that there would have been no reason for a person of ordinary skill in the art to have combined the teachings of Magome and Urano to arrive at the recitations of claim 1. Among other things, an object of the present invention is to provide an optical apparatus in which the defects (originating from defect precursors) in silica glass that forms optical element(s) that is/are included in the optical apparatus are held at a low level even when high energy light such as ultraviolet light is incident thereon over a long period.

Accordingly, the optical apparatus recited in amended claim 1 includes (among other things) a container filled with a gas containing hydrogen, an optical element of silica glass, which is subjected to a heat treatment in a hydrogen atmosphere of a pressure range of 1 to 500 kgf/cm² and a temperature range of 80 to 500°C before being accommodated in the container, and a light source of an excimer laser emitting ultraviolet light.

Because the claimed optical element of silica glass is subjected to a heat treatment in a hydrogen atmosphere of a pressure range of 1 to 500 kgf/cm² and a temperature range of 80 to 500°C before being accommodated in the container, not only are initial defects contained in the optical element repaired (i.e., the initial defects are converted into stable bonds), but, additionally, some diffused hydrogen remains in the optical element (in the silica glass). Thus, although hydrogen is consumed in the optical element to repair the defects further generated by the incidence of ultraviolet light, because the optical element is accommodated in the container filled with a gas containing hydrogen, the hydrogen contained in the optical element will not diffuse out, and hydrogen is further supplied to and diffused into the optical element (in the silica glass) when the hydrogen is consumed therein.

Therefore, one advantage of the invention recited in claim 1 is that the prevention of the generation of defects in the optical element (i.e., the effect of maintaining light transmissivity of the optical element) is continued for a long period. In contrast to the claimed invention, if the optical element were placed in a normal atmosphere after hydrogen treatment, then the hydrogen contained in the optical element would diffuse into the atmosphere and, consequently, the effect of preventing generation of defects in the optical element will not last for a long period.

In stark contrast to claim 1, the object of Magome is to provide an exposure apparatus in which superior transmissivity of UV light and superior cooling performance for the optical elements are ensured. To achieve the object, Magome teaches that nitrogen or helium is enclosed as a functional gas in the container to prevent degradation in transmissivity due to oxygen or ozone.

Because the light source used in the apparatus of Magome is an F₂ laser, it would have been apparent to a person of ordinary skill in the art when considering Magome's teachings that the material of the lenses that are combined with an F₂ laser light source is typically fluorite.¹ Moreover, if the lenses in Magome are made of fluorite, no concern regarding defects in the lenses would have arisen to a skilled artisan, even when ultraviolet light emitted from a KrF excimer laser light source or an ArF excimer laser light source is incident thereon.

In addition, a person of ordinary skill in the art would have recognized that the transmissivity of an F₂ laser light beam through a lens made of silica glass is poor. Therefore, a person of ordinary skill in the art aiming to improve the prevention of defects in a silica glass product would not have had any reason at all to look toward the teachings of Magome.

Finally, although Magome does include a description regarding the optional use of hydrogen in paragraph [0103], as pointed out by the Examiner, Magome merely teaches that this use of hydrogen is just an option for a function gas replacing air or oxygen.

Accordingly, for *at least* the reasons stated above, since there is no concern regarding defects in the lenses due to precursors in the teachings of Magome, a person of ordinary skill in

¹ The material of the lenses is not explicitly mentioned in Magome.

the art would not have had any reason to combine Magome with Urano to arrive at the recitations of claim 1. As such, it would not have been obvious for a person of ordinary skill in the art to achieve the invention of claim 1 in view of Magome and Urano for *at least* these reasons.

Further, the dependent claims 4-9 and 27-28 are patentable over the cited references *at least* by virtue of their dependency on claim 1. Thus, Applicant respectfully requests that the Examiner withdraw these rejections.

B. Independent Claim 11

Without conceding the merits of the Examiner's rejections, independent claim 11 has been amended, as set forth above, to incorporate some of the features of claims 12 and 13, and to include some of the features disclosed on page 5, lines 4-6 and on page 9, lines 7-12 of the present specification.

The Examiner acknowledges that Hagiwara fails to teach or suggest the feature of a hydrogen gas used in the container, as recited in claim 11. Nevertheless, the Examiner relies on Urano as allegedly teaching or suggesting this feature. Applicant disagrees.

As already discussed in detail above, Urano only teaches the feature of using a hydrogen treatment in manufacturing a silica glass product. Urano does not teach, or even remotely suggest, the feature of continuous supply of hydrogen into the silica glass product during use thereof. As a result, the cited references, and any combination thereof, fails to teach or suggest all the recitations of claim 11 for *at least* these reasons.

Moreover, Applicant submits that there would have been no reason for a person of ordinary skill in the art to have combined the cited reference to arrive at the recitations of claim 11. Quite to the contrary, the object of Hagiwara is to provide an exposure apparatus in which

deposition of a haze substance on optical members in an illumination optical system can be suppressed. To achieve this object, Hagiwara teaches that an inert gas, such as high-purity nitrogen gas, is enclosed as a functional gas in the container. However, a person of ordinary skill in the art would have recognized that the deposition of a haze substance on an optical member does not depend on the material of the optical member. Therefore, a skilled artisan aiming to improve the prevention of defects in silica glass products (as opposed to other materials), would not have had any reason to refer to Hagiwara for *at least* these reasons.

Finally, there also would have been no reason for a person of ordinary skill in the art to combine the teachings of Ohtsu, with those of Hagiwara and Urano, as alleged. Ohtsu teaches the feature of an atmosphere of a nitrogen gas containing 3% vol. hydrogen. However, the teachings of Ohtsu relates to a method of forming photo-catalytic film made of titanium oxide on base material and a laminated material thereof. Accordingly, the field of the invention of Ohtsu is completely different from that of the invention recited in claim 11. Therefore, a person of ordinary skill in the art aiming to improve the prevention of defects in silica glass products would not have had any reason to refer to Ohtsu for *at least* these reasons.

Accordingly, amended claim 11 would not have been obvious in view of the cited references, or any combination thereof, for *at least* these reasons. Further, the dependent claims 15-21 are patentable over the cited references *at least* by virtue of their dependency. As such, Applicant respectfully requests that the Examiner withdraw these rejections.

IV. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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CUSTOMER NUMBER

Date: January 25, 2008